

DERWENT-ACC-NO: 1994-275971

DERWENT-WEEK: 199434

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TITLE: Thermoplastic resin compsn. for vibration  
isolators  
comprises polymer mixt. with inorganic fillers  
compounded, including graft polymer obt'd. by  
polymerising  
methacrylic! ester monomers, etc.

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PATENT-ASSIGNEE: NIPPON GOSEI GOMU KK[JAPS]

PRIORITY-DATA: 1993JP-017833 (January 11, 1993)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE
JP 06207079 A	July 26, 1994	JA

APPLICATION-DATA:

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JP 06207079A	N/A	1993JP-017833
January 11, 1993		

INT-CL-CURRENT:

TYPE	IPC	DATE
CIPP	C08K3/00	20060101
CIPS	C08L101/00	20060101
CIPS	C08L33/04	20060101
CIPS	C08L33/10	20060101
CIPS	C08L51/04	20060101
CIPS	C08L55/00	20060101
CIPS	C08L55/02	20060101

ABSTRACTED-PUB-NO: JP 06207079 A

BASIC-ABSTRACT:

Resin compsn. comprises 100 pts. wt. (A) a polymer mixt. with 0-150  
pts. wt.;  
(B) inorganic fillers compounded and has loss tangent of at least  
0.035 at 25

deg.C.

(A) Consists of 10-100 wt.% (a) graft polymer obtd. by polymerising monomers consisting mainly of methacrylic esters in the presence of gummy polymers, 90-0 wt.% (b) polymers obtd. by polymerising monomers consisting mainly of methacrylic esters having Tg of 80 deg.C or higher as measured with DSC, and 0-40 wt.% (c) polymer having glass transition temp. of -10 to +70 deg.C as measured with DSC.

The methacrylic esters are methyl methacrylate and t.-butylcyclohexyl methacrylate. (B) are glass fibre, glass milled fibre, glass flake, mica, potassium titanate whisker, and wollastonite.

USE/ADVANTAGE - Used as vibration isolators. Has well balanced mechanical properties, rigidity, and vibration controlling property.

CHOSEN-DRAWING: Dwg.0/0

TITLE-TERMS: THERMOPLASTIC RESIN COMPOSITION VIBRATION ISOLATE  
COMPRISE POLYMER

MIXTURE INORGANIC FILL COMPOUND GRAFT OBTAIN POLYMERISE  
POLYMETHACRYLIC ESTER MONOMER

DERWENT-CLASS: A14 A88

CPI-CODES: A04-F06B; A08-R01; A12-H09; A12-S08D1;

UNLINKED-DERWENT-REGISTRY-NUMBERS: 5213U; 5214U ; 5272U ; 5311U ;  
5403U

ENHANCED-POLYMER-INDEXING:

Polymer Index [1.1]

017 ; G0384\*R G0339 G0260 G0022 D01 D12 D10 D51 D53 D58 D63 F41  
G0419

G0384 D11 D14 D13 D31 D93 H0146; G0384 G0339 G0260 G0022 D01 D11  
D10 D12

D51 D53 D58 D63 D85 F41 H0146 R00479 7200; H0124\*R; H0088  
H0011; L9999

L2528 L2506; H0317; P0088;

Polymer Index [1.2]

017 ; B9999 B3769 B3758 B3747; B9999 B4002 B3963 B3930 B3838  
B3747;

B9999 B3963\*R B3930 B3838 B3747; Q9999 Q7954 Q7885; K9892;  
K9449;

ND01; ND04;  
 Polymer Index [1.3]  
 017 ; G2880 D00 Si 4A G2891; A999 A237; S9999 S1092 S1070;  
 S9999  
 S1525;  
 Polymer Index [1.4]  
 017 ; D00 K\* 1A O\* 6A Ti 4B Tr R05311 129604; A999 A237; S9999  
 S1683;  
 Polymer Index [1.5]  
 017 ; G3010 D00 F80 Al 3A Si 4A O\* 6A G3418 Ca 2A; A999 A237;  
 A999  
 A771;  
 Polymer Index [2.1]  
 017 ; G0384\*R G0339 G0260 G0022 D01 D12 D10 D51 D53 D58 D63 F41  
 G0419  
 G0384 D11 D14 D13 D31 D93; G0384 G0339 G0260 G0022 D01 D11 D10  
 D12 D51  
 D53 D58 D63 D85 F41 R00479 7200; G0384 G0339 G0260 G0022 D01 D11  
 D10 D12  
 D51 D53 D58 D63 D85 F41 R00479 7200; H0011\*R; H0022 H0011;  
 L9999 L2528  
 L2506; H0317; P0088;  
 Polymer Index [2.2]  
 017 ; B9999 B3769 B3758 B3747; B9999 B4002 B3963 B3930 B3838  
 B3747;  
 B9999 B3963\*R B3930 B3838 B3747; Q9999 Q7954 Q7885; K9892;  
 K9449;  
 ND01; ND04;  
 Polymer Index [2.3]  
 017 ; B9999 B5618 B5572;  
 Polymer Index [2.4]  
 017 ; G2880 D00 Si 4A G2891; A999 A237; S9999 S1092 S1070;  
 S9999  
 S1525;  
 Polymer Index [2.5]  
 017 ; D00 K\* 1A O\* 6A Ti 4B Tr R05311 129604; A999 A237; S9999  
 S1683;  
 Polymer Index [2.6]  
 017 ; G3010 D00 F80 Al 3A Si 4A O\* 6A G3418 Ca 2A; A999 A237;  
 A999  
 A771;  
 Polymer Index [3.1]  
 017 ; P0000; H0317;  
 Polymer Index [3.2]  
 017 ; B9999 B3769 B3758 B3747; B9999 B4002 B3963 B3930 B3838  
 B3747;  
 B9999 B3963\*R B3930 B3838 B3747; Q9999 Q7954 Q7885; K9892;  
 K9449;  
 ND01; ND04;  
 Polymer Index [3.3]

017 ; B9999 B5618 B5572;  
 Polymer Index [3.4]  
 017 ; G2880 D00 Si 4A G2891; A999 A237; S9999 S1092 S1070;  
 S9999  
 S1525;  
 Polymer Index [3.5]  
 017 ; D00 K\* 1A O\* 6A Ti 4B Tr R05311 129604; A999 A237; S9999  
 S1683;  
 Polymer Index [3.6]  
 017 ; G3010 D00 F80 Al 3A Si 4A O\* 6A G3418 Ca 2A; A999 A237;  
 A999  
 A771;

POLYMER-MULTIPUNCH-CODES-AND-KEY-SERIALS:

Key Serials: 0003 0009 0039 0042 0045 0048 0051 0054 0057 0060 0063  
 0066 0069  
 0072 0075 0078 0138 0141 0144 0147 0150 0153 0165 0168 0171 0205 0224  
 0226 0231  
 0501 0502 0536 0537 0592 0593 0599 0600 2121 2122 2212 2214 2215 2220  
 2604 2623  
 2667 2751 3012 3013  
 Multipunch Codes: 02& 032 034 037 04- 06- 07& 08& 09& 09- 10& 10- 15-  
 17& 17-  
 18& 18- 19& 19- 20& 20- 229 308 309 44& 441 541 542 551 560 562 623  
 629 654 679  
 722 723 02& 034 04- 06- 07& 074 077 08& 081 082 084 085 09& 09- 10&  
 10- 15- 17&  
 17- 18& 18- 19& 19- 20& 20- 229 27& 308 309 44& 441 541 542 551 560  
 562 604 608  
 623 629 654 679 722 723 02& 04- 06- 07& 08& 09& 09- 10& 10- 15- 17&  
 17- 18& 18-  
 19& 19- 20& 20- 229 308 309 44& 441 541 542 551 560 562 604 608 623  
 629 654 722  
 723

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: 1994-126071

JAPANESE [JP,06-207079,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE  
INVENTION TECHNICAL PROBLEM MEANS EXAMPLE CORRECTION OR AMENDMENT

[Translation done.]

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- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention uses rubber strengthening methacrylic-acid-ester system thermoplastics as an essential ingredient, and relates to a useful thermoplastic resin composition for sound deadeners.

[0002]

[Description of the Prior Art]In recent years, the motion which asks for comfortable-ization of a living environment prospers, and the vibration suppression from the apparatus in a living environment and reduction of noise are called for. An example, such as specifically using for a steel plate the laminated damping steel sheet which applies and stiffened the flexible rubber-like constituent, and polypropylene in which the damping characteristic near a room temperature is excellent, can see. However, since the work process of a laminated damping steel sheet is complicated, it is expensive, and it can be used only for the use limited since it was a heavy lift. The rate of bending flexibility of polypropylene is low, and there is a problem of being able to use only the use too limited as a structure.

[0003]By the way, polymethacrylic acid ester is having a specific side chain structure, and it is a material in which a big tandelta value is shown near a room temperature.

And since it excels in rigidity, it is expected as that with which the fault of polypropylene is compensated, but since it is inferior to shock resistance, the use as a structural material is difficult.

The polymer which has a moderate damping characteristic is required as audio equipment especially the damping plate of a speaker, and a box.

Conventionally polypropylene is strengthened with an inorganic filler and the material which raised the elastic modulus is used widely.

However, in order to raise tone quality further, an appearance of the exotic material which has

equivalent performance by unreinforcement or low content is desired strongly.

[0004]

[Problem(s) to be Solved by the Invention]An object of this invention is to provide the thermoplastic resin composition which was made against the background of the technical problem of said conventional technology, improved the shock resistance of poly methyl methacrylate, was excellent in rigidity, and was excellent in the damping nature which has a structural material and the performance for which it was suitable as an acoustic component.

[0005]

[Means for Solving the Problem]10 to 100 % of the weight of graft polymers produced by this invention polymerizing a monomer which uses methacrylic acid ester as the main ingredients under existence of a (b) rubber-like polymer, (\*\*) 90 to 0 % of the weight of polymers produced by glass transition temperature measured with a differential calorimeter (DSC) polymerizing a monomer which uses as the main ingredients the methacrylic acid ester which is not less than 80 \*\*, (\*\*) 0 to 40 % of the weight of polymers in a range whose glass transition temperature measured with a differential calorimeter (DSC) is -10 \*\*--70 \*\* [ -- however, (\*\*) -- + (\*\*) -- + (\*\*) -- as opposed to polymer mixture 100 weight section which uses = 100-% of the weight] as the main ingredients -- (\*\*) -- the inorganic filler 0 - 150 weight sections are blended, and a loss tangent (tandelta) at 25 \*\* provides a thermoplastic resin composition which is 0.035 or more.

[0006](\*\*) of this invention -- although a rubber-like polymer used for an ingredient names generically a polymer in which rubber-like description is shown at a room temperature, that [ its ] whose glass transition temperature (Tg) by differential calorimeter (DSC) measurement is less than -20 \*\* is preferred. As an example of this rubber-like polymer, polybutadiene, polyisoprene, A styrene butadiene random copolymer, an acrylonitrile butadiene random copolymer, Diene system polymers, such as a styrene butadiene block copolymer and a styrene isoprene block copolymer, And these hydrogenation things, ethylene-propylene-(diene) rubber, ethylene-butene-(diene) rubber, acrylic rubber, isobutylene isoprene rubber, silicone rubber, etc. are mentioned, and these are independent, or are mixed and used.

[0007]In a point of shock resistance and processability to a number average molecular weight, 50,000-1 million are desirable still more preferred, and molecular weights of a rubber-like polymer used for a (b) ingredient are 70,000-800,000. Although content of a rubber-like polymer in a (b) ingredient can be arbitrarily chosen according to the purpose, in order to attain a high throughput, it is usually 15 to 60 % of the weight preferably ten to 70% of the weight.

[0008](b) As for the methacrylic acid ester used of an ingredient, it is preferred that glass transition temperature by DSC measurement at the time of becoming a polymer independently is not less than +65 \*\*. As an example of these methacrylic acid ester, Methyl methacrylate, t-butyl methacrylate, t-butyl methacrylate cyclohexyl, Cyclohexyl methacrylate, methacrylic acid N-phenylamide, ethyl methacrylate, methacrylic acid phenyl, methacrylic acid-2-naphthyl, etc.

are mentioned, and these are independent, or are mixed and used. In these methacrylic acid ester, methyl methacrylate, t-butyl methacrylate cyclohexyl, Methacrylic acid phenyl, methacrylic acid-2-naphthyl, and methacrylic acid N-phenylamide are preferred, and especially especially methyl methacrylate and t-butyl methacrylate cyclohexyl are preferred.

[0009](b) In an ingredient, other monomers which can polymerize may be used together with methacrylic acid ester as a monomer. As an example of other monomers, an aromatic vinyl compound, a vinyl cyanide compound, N-substitution maleimide compound, methacrylic acid, acrylic acid, a maleic anhydride, etc. are used preferably. As an aromatic vinyl compound, for example Among these, styrene, t-butylstyrene, Alpha-methylstyrene, p-methylstyrene, vinylxylene, mono- KURORU styrene, dichloro styrene, mono- bromine styrene, and a jib -- ROM styrene and fluorostyrene. p-t-butylstyrene, ethylstyrene, vinylnaphthalene, divinylbenzene, 1,1-diphenylstyrene, N,N-diethyl- p-aminoethyl styrene, vinylpyridine, etc. are mentioned, and especially styrene and alpha-methylstyrene are preferred.

[0010]As an example of a vinyl cyanide compound, acrylonitrile, a methacrylonitrile, etc. are mentioned and especially acrylonitrile is preferred. As an N-substitution maleimide compound, N-methylmaleimide, N-butylmaleimide, N-phenylmaleimide, N-cyclohexylmaleimide, N-ethyl malei mide, N-isopropylmaleimide, N-t-butylmaleimide, etc. are mentioned, and N-phenylmaleimide, N-cyclohexylmaleimide, and N-t-butylmaleimide are especially preferred.

[0011](\*\*) a rate of a monomer used for an ingredient -- monomer (weight ratio) =100-50/0-50 besides methacrylic-acid-ester/-- desirable -- 100-55/0-45 -- it is 100-60/0-40 still more preferably. Damping performances of a constituent in which methacrylic acid ester is obtained at less than 50 % of the weight are inferior, and it is not desirable.

[0012]A (b) graft polymer of this invention can be manufactured with the various methods of carrying out the radical polymerization of the monomer which uses methacrylic acid ester as the main ingredients under existence of a rubber-like polymer, for example, an emulsion polymerization method, a mass polymerization method, a suspension polymerization method, etc. A (b) graft polymer is the intrinsic viscosity of methyl-ethyl-ketone extractives. [eta] 0.3 or more dl/g measurement) is 0.4 - 0.8 dl/g still more preferably 0.35 to 1 dl/g preferably at (30 \*\*. 5 % of the weight or more is desirable still more preferred, and a graft rate of a (b) graft polymer is 10 to 100 % of the weight.

[0013]Next, a (\*\*) ingredient used by this invention is a polymer produced by polymerizing a monomer which uses methacrylic acid ester as the main ingredients, and a desirable monomer and its ingredient ratio are the same as that of a monomer which constitutes said (b) ingredient. (\*\*) Not less than 80 \*\* of Tg(s) by DSC measurement of a polymer of an ingredient are usually not less than 90 \*\* preferably from a heat-resistant point of a constituent. Especially a desirable (\*\*) ingredient Poly methyl methacrylate, a methacrylic acid methyl-styrene copolymer, A methyl methacrylate maleic anhydride copolymer, a methacrylic acid methyl-



styrene N-cyclohexylmaleimide copolymer, a methacrylic acid methyl-styrene acrylonitrile copolymer, etc. are mentioned. weight average molecular weight of a (\*\*) ingredient -- usually - 80,000-400,000 -- desirable -- 100,000-300,000 -- it is 120,000-250,000 especially preferably.

[0014]next, a glass transition temperature according [ a (\*\*) ingredient ] to DSC measurement - 10 \*\* - +70 \*\* are the polymers which are within the limits of 10-50 \*\* preferably especially 0-60 \*\*. (\*\*) An ingredient is used when a tandelta value of a certain specific temperature range wants to improve. For example, when a tandelta value in a certain temperature (example; 40 \*\*) wants to improve, a tandelta value at the temperature can be effectively raised by carrying out adequate amount combination of the polymer which has glass transition temperature near 40 \*\*. Therefore, although not limited especially as a monomer which constitutes a polymer of a (\*\*) ingredient, it is more desirable to mix with a (b) ingredient and/or a (\*\*) ingredient to some extent.

[0015](\*\*) what is a polymer which uses acrylic ester (meta-) as a main ingredient as an example of an ingredient, is a copolymer of an aromatic vinyl compound and acrylic ester (meta-), and is in said glass-transition-temperature range is preferred. As an example of this aromatic vinyl compound and (meta) acrylic ester, (b) - a monomer used for a (\*\*) ingredient -- in addition, methyl acrylate. Ethyl acrylate, butyl acrylate, isobutyl acrylate, 2-ethylhexyl acrylate, acrylic acid 2-hydroxyethyl, acrylic acid hydroxypropyl, butyl methacrylate, methacrylic acid 2-hydroxyethyl, methacrylic acid i-butyl, 2-ethylhexyl methacrylate, etc. are mentioned, and these are independent -- it is -- it can be combined and used.

[0016]As an ingredient, it is not necessarily limited above and, for example (\*\*) Styrene butadiene of high styrene content, Random or random or block copolymers of block copolymers and these hydrogenation things, and styrene isoprene, these hydrogenation things, etc. can be used. (\*\*) weight average molecular weight of an ingredient -- usually -- 50,000-400,000 -- it is 80,000 to about 300,000 preferably.

[0017](b) - a (\*\*) ingredient are manufactured by an emulsion polymerization, solution polymerization, suspension polymerization, etc. In this case, a polymerization initiator, a molecular weight modifier, an emulsifier, a dispersing agent, a solvent, etc. which are used for a polymerization can usually use as it is what is used by these polymerizing methods.

[0018](\*\*) An inorganic filler is blended in order to adjust the rigidity of a constituent obtained. An example of this (\*\*) inorganic filler is the usual inorganic filler used for rubbers, such as glass fiber, a glass milled fiber, a glass flake, a glass bead, talc, mica, carbon fiber, a potassium titanate whisker, straw SUTONAITO, kaolin, and silica, and a plastic. Especially in these, glass fiber, a glass milled fiber, a glass flake, mica, a potassium titanate whisker, straw SUTONAITO, etc. are preferred.

[0019]The amount of (b) in this invention - (\*\*) ingredient used is 10 to 100 % of the weight of

(b) ingredients, 90 to 0 % of the weight of (\*\*) ingredients, and 0 to 40 % of the weight of (\*\*) ingredients. as opposed to polymer mixture 100 weight section which uses [however, (b) + (\*\*) + (\*\*) = 100 % of the weight] as the main ingredients -- a (\*\*) ingredient -- it is 0 - 100 weight section preferably zero to 150 weight section. Since this composition ratio changes with physical properties required of the target constituent, it is difficult for discussing generally, according to the purpose, is in a mentioned range and is determined suitably.

[0020](b) The range with preferred  $I(**) / (**)$  ingredient is as follows.

\*\*  $(**) / (**)$  --  $I(**)$  -- it becomes the constituent whose damping performances ( $\tan \delta$  value) are highly constant and which was excellent in rigidity in their being  $= 20-80/80-20 / 0$  to 30 % of the weight, and was excellent in a frequency characteristic at a large temperature ( $-50$  \*\* -  $+70$  \*\*).

\*\* (b) excel in rigidity that they are  $I(**) / (**)$   $= 70-98/0-70 / 2$  to 30 % of the weight, and specific damping performances were excellent, namely, serve as a constituent excellent in damping performances in a certain specific temperature or frequency in the glass-transition-temperature neighborhood of a (\*\*) ingredient.

\*\* (b) it has the feature of the above-mentioned \*\* - \*\* as they are  $I(**) / (**)$   $= 20-65/78-5 / 2$  to 30 % of the weight, and it becomes the constituent which has good damping performances in a wide temperature requirement or a wide frequency range and in which the performance in a specific temperature or frequency was reinforced.

[0021](b) When an ingredient exceeds less than 10 % of the weight and a (\*\*) ingredient exceeds 90 % of the weight, shock resistance is inferior and it is not suitable for practical use. On the other hand, when a (\*\*) ingredient exceeds 40 % of the weight, a shock-proof fall and a rigid fall are produced and it becomes a constituent which does not fit practical use too. If a (\*\*) inorganic filler is used exceeding 150 weight sections, since the mobility of a constituent gets worse extremely and molding workability is inferior, it is not desirable.

[0022]The minimum needed is used for a point which should be taken into consideration when determining a presentation of a constituent of this invention when a partial increase in  $\tan \delta$  and rigid improvement are required for (\*\*) and a (\*\*) ingredient. Although it is an ingredient which raises the shock resistance of a constituent, and is in a mentioned range and is used preferably, since a (b) ingredient differs in a kind and quantity of a rubber-like polymer which are contained for a (b) ingredient in each case, it takes into consideration the amount of rubber-like polymers which originates in a (b) ingredient in a constituent more correctly. namely, -- content of a rubber-like polymer in a constituent of this invention receives a resinous principle in a constituent -- usually -- it is 5 to 25 % of the weight still more preferably four to 30% of the weight preferably three to 35% of the weight. At less than 3 % of the weight, shock resistance is inferior, and when it, on the other hand, exceeds 35 % of the weight, molding workability and rigidity are inferior.

[0023]A value of a loss tangent ( $\tan \delta$ ) at 25 °C of a constituent of this invention is usually 0.06 or more especially preferably 0.05 or more still more preferably 0.04 or more preferably 0.035 or more. It is inferior to damping performances by less than 0.035.

[0024]An additive agent generally used in resin compositions, such as a spray for preventing static electricity, an antioxidant, fire retardant, an ultraviolet ray absorbent, a photooxidation inhibitor, colorant, and lubricant, if needed can be used for a thermoplastic resin composition of this invention.

[0025]In order to manufacture a constituent of this invention, it is mixable using various kinds of devices generally used for kneading of thermoplastics, such as a Banbury mixer, Brabender, Plast Mill, a kneader, and an extruder with a vent, and a method, but a method of using especially an extruder with a vent is preferred. When blending an inorganic filler especially, a 2 axis extruder or a method of manufacturing using a continuation kneader is preferred. Although kneading temperature is based also on a presentation, it is desirable to carry out within the limits of 180-300 °C.

[0026]

[Example]Although an example is given and this invention is explained still more concretely hereafter, this invention is not limited to these examples. Among an example, a part and especially % are weight references, unless it refuses. Evaluation of the various kinds of an example depended on the following valuation method.

The Izod impact was measured according to shock-proof (Izod impact) ASTM D256. A unit is kgfcm/cm.

It measured according to melt flow rate ASTM D1238 (220 °C, 10 kg loads). Units are g/10min.

[0027]It measured according to heat-deflection-temperature ASTM D648 (1/4 inch, 18.6 kg/cm<sup>2</sup> load).

According to JIS K7203, the rate of bending flexibility was measured using the bending test JIS No. 1 dumbbell. A unit is kg/cm<sup>2</sup>.

According to JIS K7113, the tensile test was done using tensile strength and an elongation-after-fracture JIS No. 1 dumbbell. Tensile strength is [ kg/cm<sup>2</sup> and elongation after fracture of a unit ] %.

It measured made in  $\tan \delta$  Oriental Baldwin and using viscoelasticity measuring apparatus DDV-III EP by a part for frequency [ of 11 Hz ], and measurement temperature-100 °C - +100 °C and heating-rate [ of 2 °C /min ].

[0028]To autoclave with an example content volume of manufacture of 5 l. of a reference example rubber-like polymer. After teaching the cyclohexane 2,500g, 175g of styrene, and 32.5 g of 1,3-butadiene which deaerated and dried, the temperature-up polymerization was performed so that 2.5g of tetrahydrofurans and the n-butyl lithium 0.34g might be added and

polymerization temperature might be 80 °C from 30 °C. After polymerization conversion became about 100%, 0.14g of  $\text{SiCl}_4$  was added. Then, 2,6-di-*t*-butylcatechol was added, polymerization liquid was sampled and it was made analysis. The styrene butadiene copolymers which polymerized by analysis were 30% of a vinyl bond content, 35% of styrene content, and  $\text{Mw/Mn}=1.5$ .

[0029]Then, naphthenic-acid nickel:n-butyl lithium which replaced the inside of a system by nitrogen gas, and was beforehand prepared with another container. The catalytic liquid of tetrahydrofuran =1:8:20 (mole ratio) was prepared so that it might become 1 mol as a nickel atom to 2,000 mol of portions used as an olefin. Then, hydrogen gas was introduced in the system of reaction, and the hydrogenation reaction was performed at 70 °C. From the absorption amount of consumption of hydrogen gas, after controlling a hydrogenation rate, nitrogen gas replaced hydrogen gas in a system, and 1phr addition of the 2,6-di-*t*-butyl-p-cresol which is an antiaging agent was carried out. It is a deed about roll desiccation by the conventional method after repeating deaeration and coagulation. The hydrogenation diene system copolymer of 90% of the hydrogenation rate was obtained.

[0030]The emulsion polymerization of 45 copies of methyl methacrylate, ten copies of styrene, and five copies of acrylonitrile was carried out under the existence of 40 copies (solid content conversion) of polybutadiene latex which is an example rubber of manufacture-like polymer of a graft polymer (Example 1), and graft polymer (Example 1) was obtained.

[0031]It stirred, after it taught 25 copies of hydrogenation diene system copolymers, 100 copies of toluene, 60 copies of methyl methacrylate, and 15 copies of styrene which were indicated for the example of manufacture of the example of manufacture aforementioned rubber-like polymer of a graft polymer (Example 2) to the autoclave provided with the agitator and nitrogen gas replaced the inside of a system. After checking that contents had become uniform, the solution which dissolved temperature up and 0.3 copy of benzoyl peroxide in five copies of methyl ethyl ketone at 80 °C was poured in. The polymerization was performed at 100 °C for 4 hours, after checking that yield had reached to about 100%, reaction mixture was cooled to the room temperature, the coagulation and deaeration carried out in methanol, and graft polymer (Example 2) was obtained.

[0032]As an example monomer of manufacture of a graft polymer (Example 3), graft polymer (Example 3) was obtained according to the example of manufacture of graft polymer (Example 1) except having used 45 copies of styrene, and 15 copies of acrylonitrile.

As an example monomer of manufacture of a graft polymer (Example 4), graft polymer (Example 4) was obtained according to the example of manufacture of graft polymer (Example 2) except having used 55 copies of styrene, and 20 copies of acrylonitrile.

[0033]Using 80 copies of methyl methacrylate, and 20 copies of styrene as an example monomer of manufacture of a polymer (low 1), under the nonexistence of a rubber-like

polymer, solution polymerization was performed according to the example of manufacture of graft polymer \*\* - 2, and the polymer low 1 was obtained.

As an example monomer of manufacture of a polymer (low 2), except having used 65 copies of methyl methacrylate, ten copies of styrene, and 25 copies of N-cyclohexylmaleimide, solution polymerization was performed according to the example of manufacture of the polymer low 1, and the polymer low 2 was obtained.

[0034]As an example monomer of manufacture of a polymer (Haar 1), except having used 54 copies of styrene, and 46 copies of ethyl acrylate, solution polymerization was performed according to the example of manufacture of the polymer low 1, and polymer Haar 1 was obtained. Polymer Haar's 1 glass transition temperature by DSC measurement was 46 \*\*.

As an example monomer of manufacture of a polymer (Haar 2), except having used 66 copies of styrene, and 34 copies of 2-ethylhexyl acrylate, solution polymerization was performed according to the example of manufacture of the polymer low 1, and polymer Haar 2 was obtained. Polymer Haar's 2 glass transition temperature by DSC measurement was 33 \*\*.

[0035]It is a kneading machine by the combination formula shown in the one to Examples 1-10 and comparative example 6 tables 1-3. The injection molding machine after coming using [the product made by Buss, and Ko-KneaderMDK46] and drying at 90 \*\* The test piece was produced using [Product made from a Toshiba machine, and IS80A], and physical properties were evaluated. However, the test piece for dynamic viscoelasticity measurement started 50 mm long and a 7-mm-wide strip-of-paper-like sample from the 1-1.2-mm-thick board molding.

[0036]It turns out that the constituents of this invention of Examples 1-10 are damping nature and a constituent excellent in rigid balance so that clearly from Tables 1-2. On the other hand, the comparative examples 1-2 are examples to which (b) and a (\*\*) ingredient do not carry out copolymerization of the methacrylic acid ester so that clearly from Table 3.

25 \*\* tandelta is low and it turns out that it is inferior to damping nature.

The comparative example 3 is an example using the (\*\*) ingredient which has not carried out copolymerization of the methacrylic acid ester.

25 \*\* tandelta is low, and since it is inferior in damping nature and does not get used with a (b) ingredient, its dynamic strength is also low.

[0037]The comparative example 4 is an example which used the (\*\*) ingredient out of the range of this invention. Although a tandelta value improves, rigidity and a mechanical property are inferior and it is not suitable for practical use. The comparative example 5 is an example which used the (\*\*) ingredient out of the range of this invention. Molding workability was extremely inferior and injection molding was impossible for it. The comparative example 6 is an example which used (b) and a (\*\*) ingredient out of the range of this invention.

The Izod impact is not low suitable for practical use.

[0038]

[Table 1]

	実 施 例				
	1	2	3	4	5
配合処方（部）					
（イ）成分種類	イ-1	イ-2	イ-2	イ-2	イ-1
部	30	100	70	100	30
（ロ）成分種類	ロ-1	-	PMMA* <sup>2</sup>	-	ロ-2
部	70	-	30	-	70
（ハ）成分種類	-	-	-	-	-
部	-	-	-	-	-
（ニ）成分種類	-	-	-	マイカ* <sup>3</sup>	-
部	-	-	-	25	-
物性					
アイゾットインパクト	14	10	6	5	12
メルトフローレート	20	35	38	25	5
熱変形温度	90	85	90	95	105
曲げ弾性率	31,000	24,000	30,000	46,000	32,000
引張強度	520	500	530	550	550
破断伸び	21	40	30	20	15
tan $\delta$ (25℃)	0.07	0.07	0.07	0.065	0.07
tan $\delta$ ピーク温度* <sup>1</sup>	-	-	-	-	-
tan $\delta$ ピーク値* <sup>1</sup>	-	-	-	-	-

[0039]

[Table 2]

	実 施 例				
	6	7	8	9	10
配合処方(部)					
(イ) 成分種類	イ-2	イ-2	イ-2	イ-2	イ-2
部	85	85	70	100	70
(ロ) 成分種類	-	-	ロ-1	-	PMS **
部	-	-	30	-	30
(ハ) 成分種類	ハ-1	ハ-2	-	-	-
部	15	15	-	-	-
(ニ) 成分種類	-	-	マイカ**3	GF **4	-
部	-	-	50	30	-
アイソットインパクト	8	8.5	4	8	6
メルトフローレート	40	45	15	10	25
熱変形温度	85	82	95	95	100
曲げ弾性率	21,000	21,000	75,000	55,000	31,000
引張強度	480	480	600	580	530
破断伸び	30	32	7	6	25
tan δ (25℃)	0.07	0.07	0.06	0.06	0.07
tan δ ピーク温度*1	60℃	50℃	-	-	-
tan δ ピーク値*1	0.09	0.1	-	-	-

[0040]

[Table 3]

	比 較 例					
	1	2	3	4	5	6
配合処方(部)						
(イ) 成分種類	イ-3	イ-4	イ-1	イ-2	イ-2	イ-1
部	30	100	30	40	100	5
(ロ) 成分種類	AS **	-	AS **	-	-	ロ-1
部	70	-	70	-	-	95
(ハ) 成分種類	-	-	-	ハ-1	-	-
部	-	-	-	60	-	-
(ニ) 成分種類	-	-	-	-	マイカ*3	-
部	-	-	-	-	200	-
物性						
アイソットインバクト	20	12	6	3	成形 不能	1.5
メルトフローレート	18	30	25	150		30
熱変形温度	95	90	90	40		92
曲げ弾性率	30,000	24,500	29,000	8,500		33,000
引張強度	540	530	510	150		600
破断伸び	25	35	2	40		10
tan $\delta$ (25℃)	0.025	0.025	0.03	0.07		0.07
tan $\delta$ ピーク温度*1	-	-	-	60℃		-
tan $\delta$ ピーク値*1	-	-	-	1.1		-

[0041]\*1) Only when there was a peak which appears in not less than  $\delta$  (25 \*\*); 25 \*\* of tan (s), it described.

\*2) PMMA; poly methyl methacrylate [The Kuraray Co., Ltd. make, the parapet G]

\*3) Mica; the Tomoe Engineering make, the Mika Rhett 21PU\*4GF; fiber diameter of 13 micrometers, 3 mm of cut length's glass fiber \*5PMS; methyl methacrylate maleic anhydride copolymer [The Kuraray Co., Ltd. make, the parapet SH]

\*6) AS; acrylonitrile styrene copolymer (acrylonitrile joint content = 27%)

[0042]

[Effect of the Invention]The thermoplastic resin composition of this invention is excellent in the balance of dynamic strength, rigidity, and damping nature, For example, they are a charge of a housing material which incorporates devices which rotate or vibrate, such as a motor, a speaker diaphragm of which moderate damping characteristic and rigidity are required, or a material suitable for the housing of a loudspeaker body.



[Translation done.]